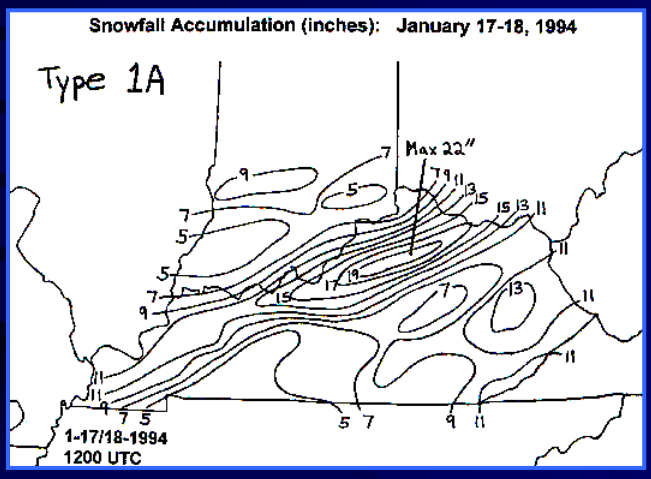
Synoptic Patterns Associated with Heavy Snowfall Events Across Kentucky and Southern Indiana

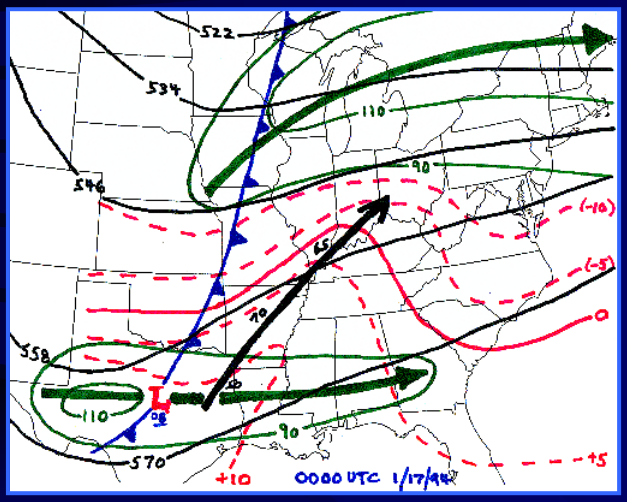
Ted Funk
WFO Louisville

Type 1A: January 17-18, 1994



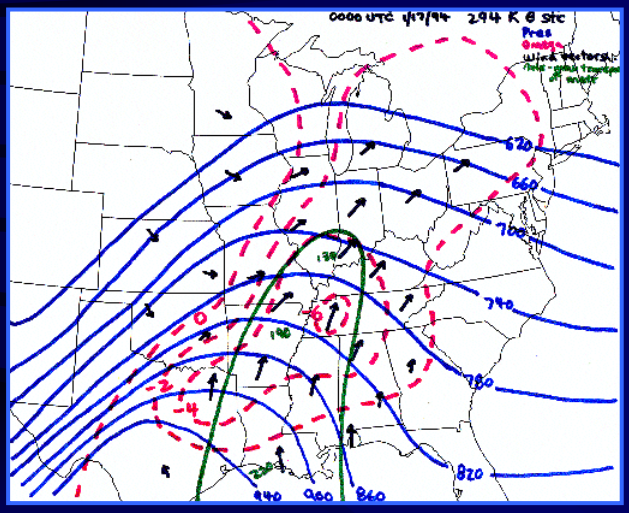
Snowfall totals (in inches) from the January 17-18, 1994 snowstorm

Type 1A:
00 UTC January 17, 1994



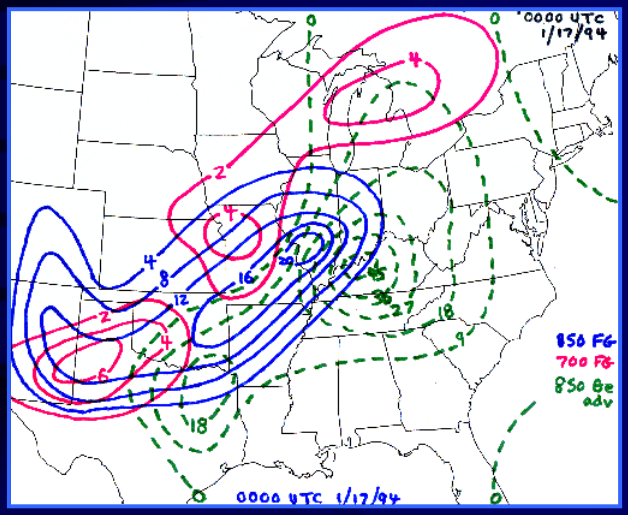
Surface fronts, 850 mb low-level jet (black arrow), 850 mb temps (red), 500 mb heights (every 120 m, black), 300 mb isotachs and jet core (green)

Type 1A:
00 UTC January 17, 1994



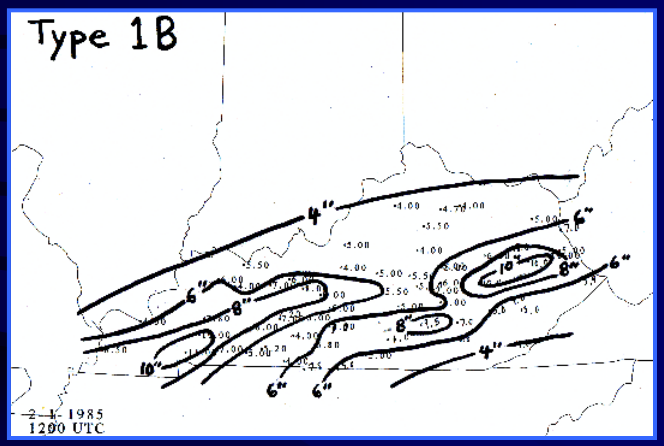
Pressure lines (blue), winds (black arrows), and omega (negative = ascent, red) on 294 K isentropic surface; low-level moisture transport axis (green)

Type 1A:
00 UTC January 17, 1994



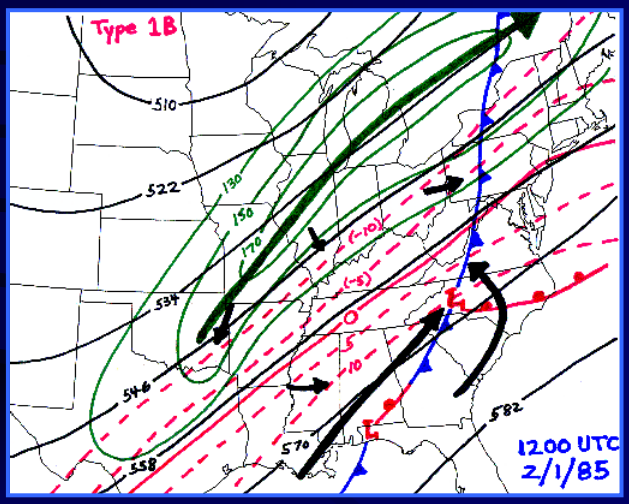
850 mb (blue) and 700 mb (red) frontogenesis; 850 mb equivalent potential temperature (theta-e) advection (green)

Type 1B:
February 1, 1985



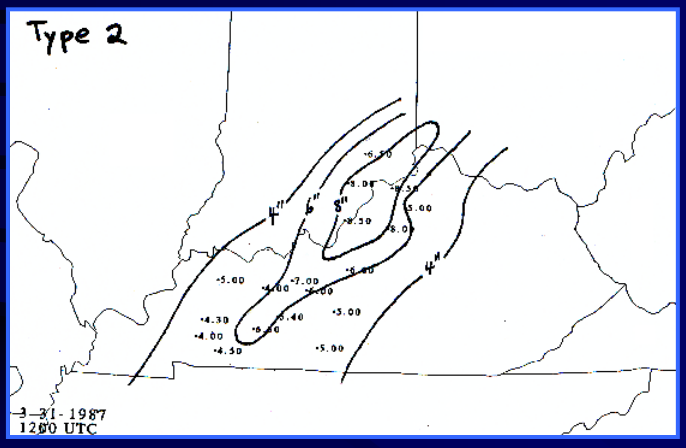
Snowfall totals (in inches) from the February 1, 1985 snowstorm

Type 1B:
12 UTC February 1, 1985



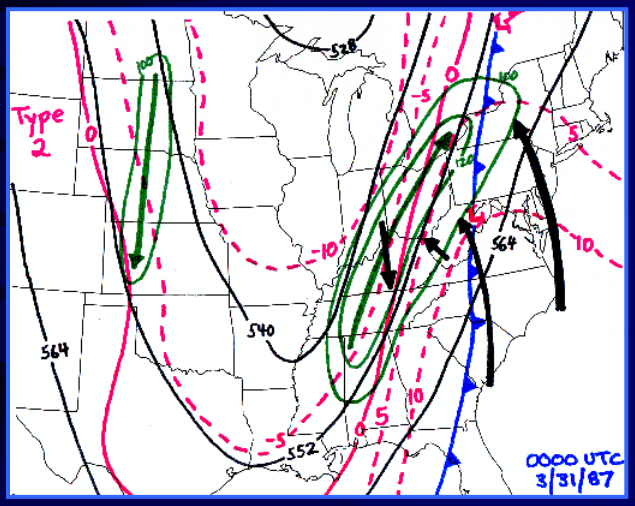
Surface fronts, 850 mb low-level flow (black arrows), 850 mb temps (red), 500 mb heights (every 120 m, black), 300 mb isotachs and jet core (green)

Type 2:
March 31, 1987



Snowfall totals (in inches) from the March 31, 1987 snowstorm

Type 2:
00 UTC March 31, 1987



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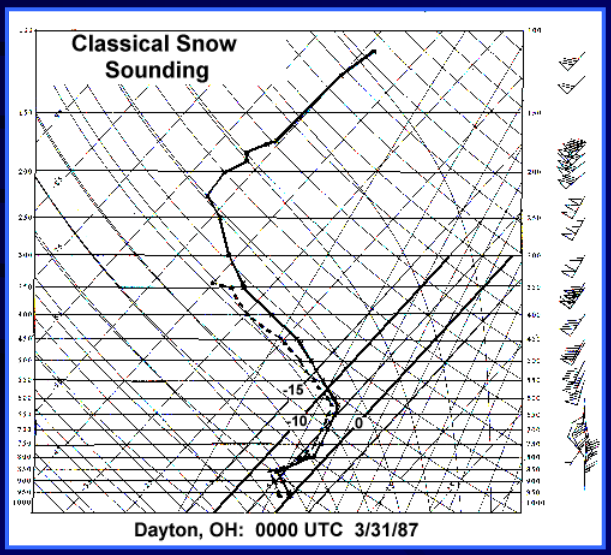
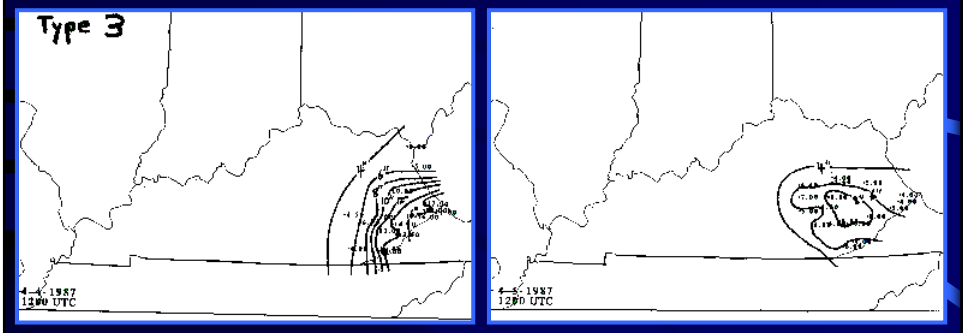
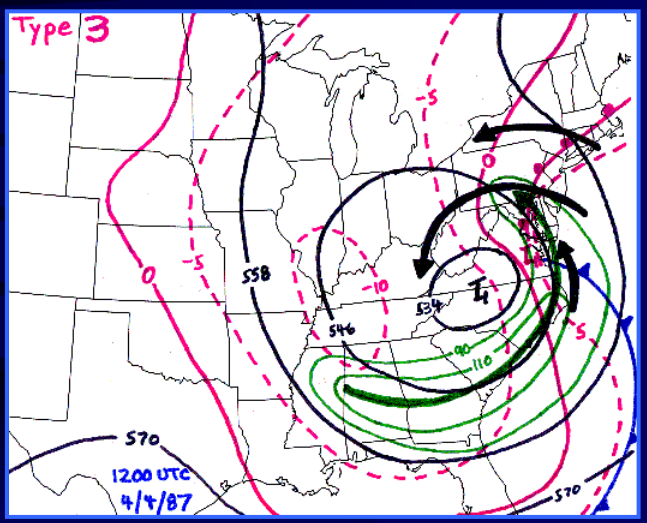


Type 3:
April 4-5, 1987



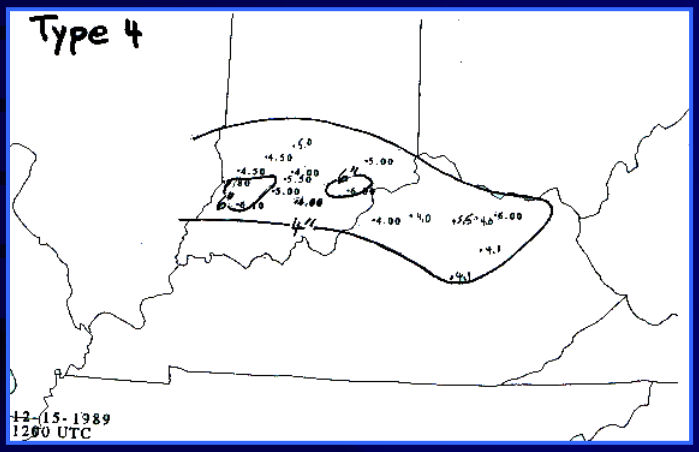
Snowfall totals (in inches) from the April 4-5, 1987 snowstorm

Type 3:
12 UTC April 4, 1987



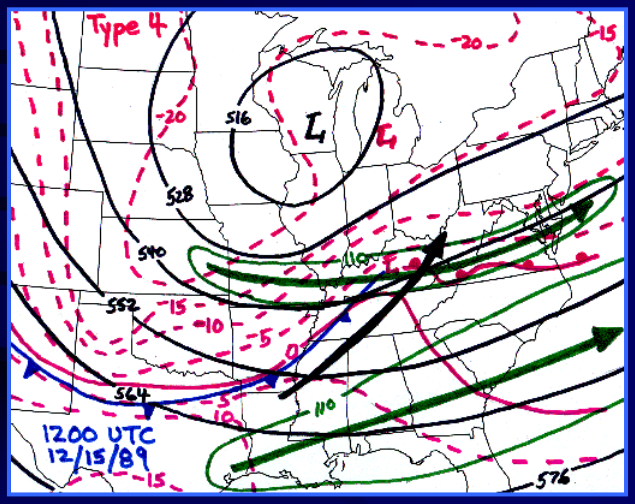
Surface fronts, 850 mb low-level flow (black arrows), 850 mb temps (red), 500 mb heights (every 120 m, black), 300 mb isotachs and jet core (green)

Type 4:
December 15, 1989



Snowfall totals (in inches) from the December 15, 1989 snowstorm

Type 4:
12 UTC December 15, 1989



Surface fronts, 850 mb low-level flow (black arrows), 850 mb temps (red), 500 mb heights (every 120 m, black), 300 mb isotachs and jet core (green)

Summary

Type 1A: Broad southwest flow at 500 mb with embedded southern stream short-wave; right entrance region of 300 mb jet streak; LLJ and theta-e ridge axis directed toward area of heavy snowfall; strong isentropic lift; relatively weak surface system

Type 1B: Similar to Type 1A in middle and upper levels; core of LLJ, theta-e ridge axis and warm advection are south and east of snow area; snow area near 850 mb trough axis with southwest flow aloft overrunning 850 mb

Type 2: Deep, open trough at 500 mb (more of a southerly component to flow); 300 mb jet east of trough axis nearly coincident with snow area; stronger surface and 850 mb low centers; snow often north or west of 850 mb low (with warm air ahead of low), occasionally snow ahead of 850 mb low if ambient cold air in place

Type 3: Deep, closed off 500 mb and 850 mb lows; strong surface low; 300 mb jet south or east of area; snow area usually to the left of upper jet, perhaps in left exit region; snow sometimes in comma head to northeast to northwest of 500 mb low

Type 4: Deep, polar vortex 500 mb low and low-level arctic air around Great Lakes with shortwave usually rotating through broad cyclonic middle-level flow; shortwave creates low-level warm advection and isentropic lift overtop cold air